Networks, Genome-Wide Associations and the Knowledge Base on Genetic Variation and Human Health

HuGENet Workshop
January 24-25, 2008, Atlanta, Georgia

Outline

- Goal and objectives
- Who is here?
- Background: HuGENet roadmap
- Workshop process and outcomes

Goals and Objectives

- Overarching Goal
  - Develop a distributed authoritative and updated online knowledge base on genetic variation and human health
- Workshop Objectives
  - Review progress of the HuGENet roadmap
  - Discuss pilot “field synopses” projects that have used Venice guidelines
  - Discuss approaches to integrate GWAS data
  - Discuss a distributed online knowledge base approach

Who is Here?
Fantastic Collection of People Representing Major Initiatives

- **Investigators**/networks/consortia/GWAS/ biobanks
- **Systematic reviewers**: conduct field synopses and write knowledge base summaries
- **Methods developers**: tools and resources
- **Publishers**: journal editors, NCBI-connecting text and databases

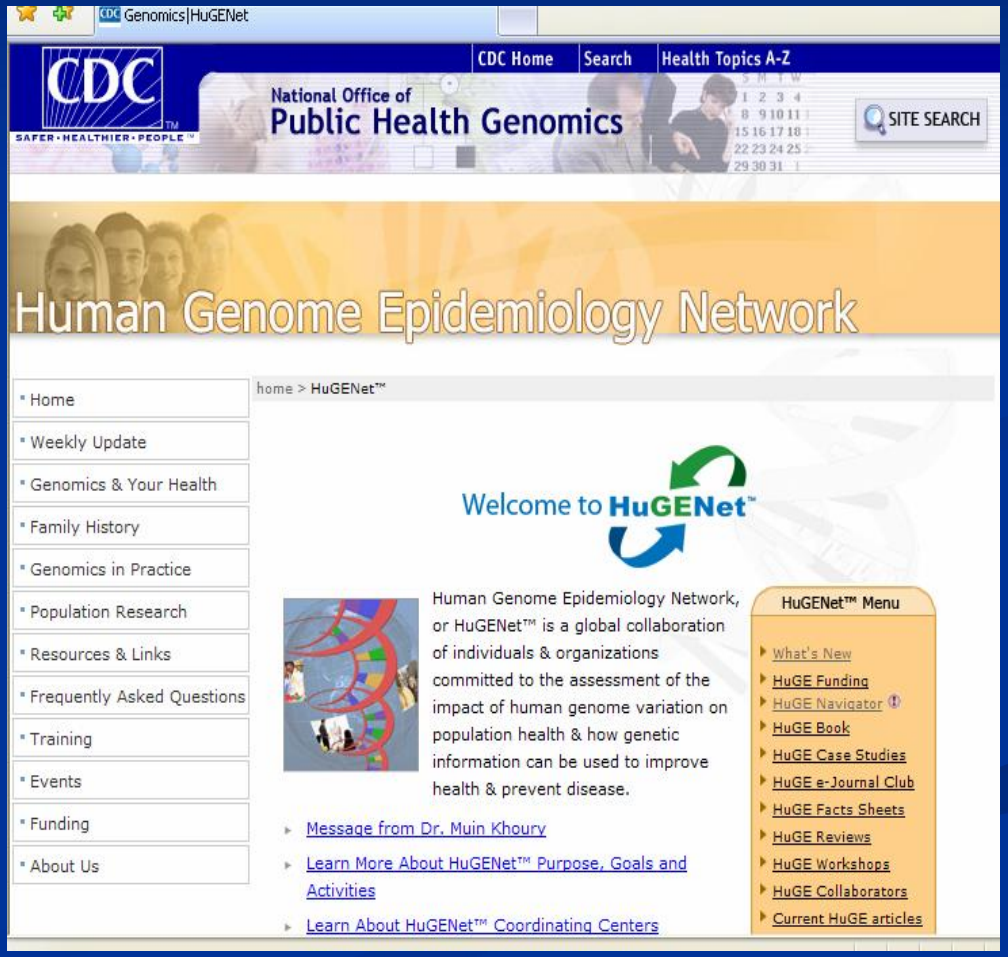
Background

- What is HuGENet?
- HuGENet roadmap
- The concept of field synopsis
- What about GWAS?

Human Genome Epidemiology Network

HuGENet™

- Global collaboration of individuals & organizations committed to the assessment of the impact of human genome variation on population health & how genetic information can be used to improve health & prevent disease



Human Genome Epidemiology Network

HuGENet™

- HuGE Navigator
- Individual and Network collaborations
- Methods for systematic reviews/ journal collaborations
- Methods for strengthened reporting

www.cdc.gov/genomics/hugenet

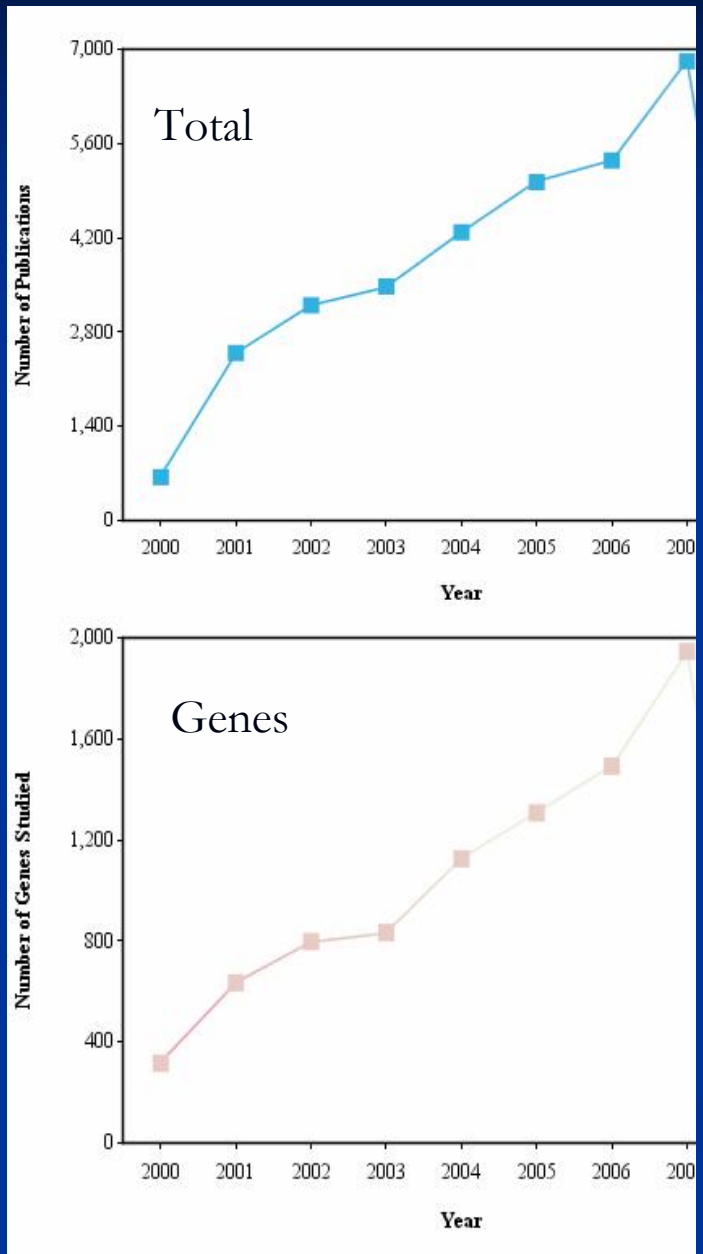
http://www.hugenet.ca HuGENet Canada

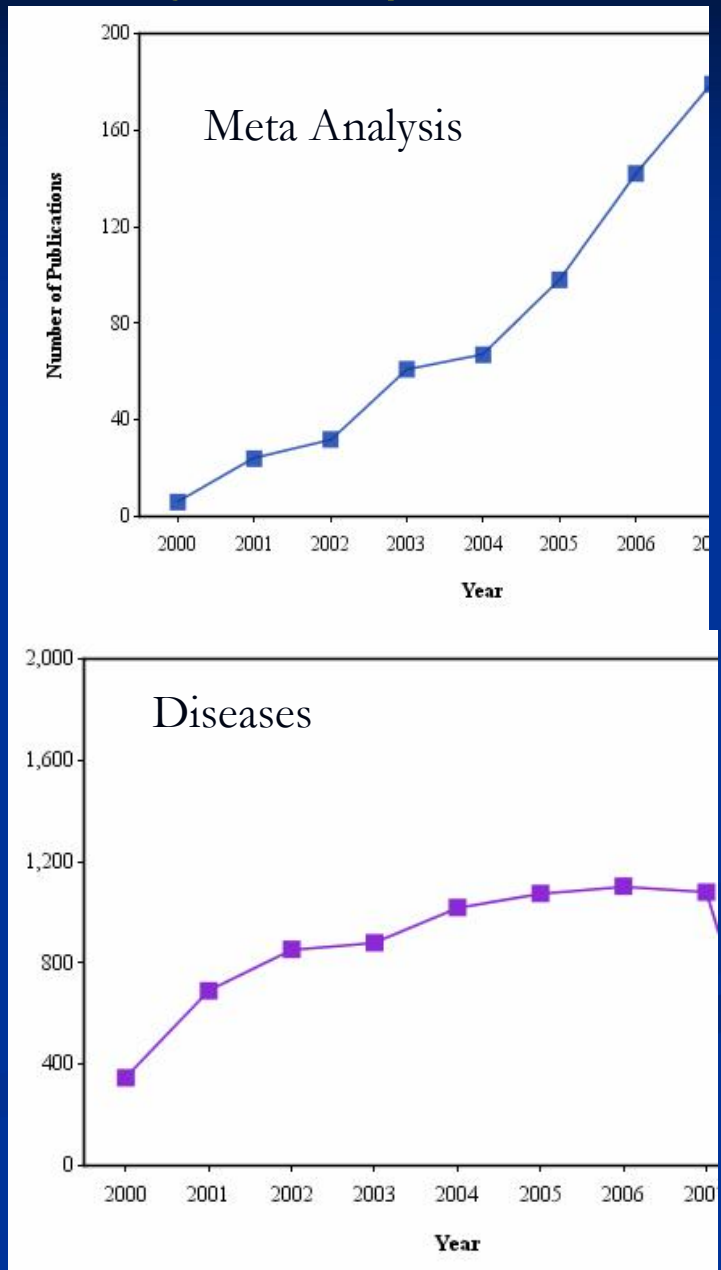
http://www.hugenet.org.uk UK HuGENet Coordinating Centre

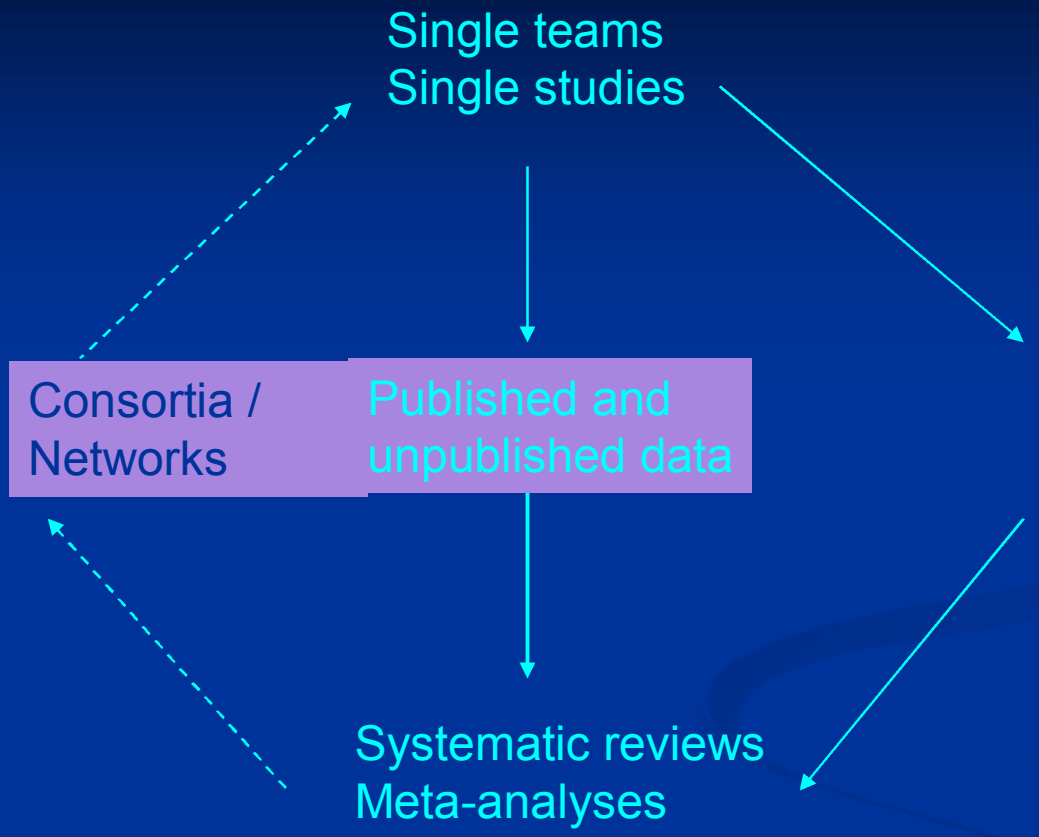
http://www.dhe.med.uoi.gr/hugenet.htm Department of Hygiene and Epidemiology, University of Ioannina School of Medicine

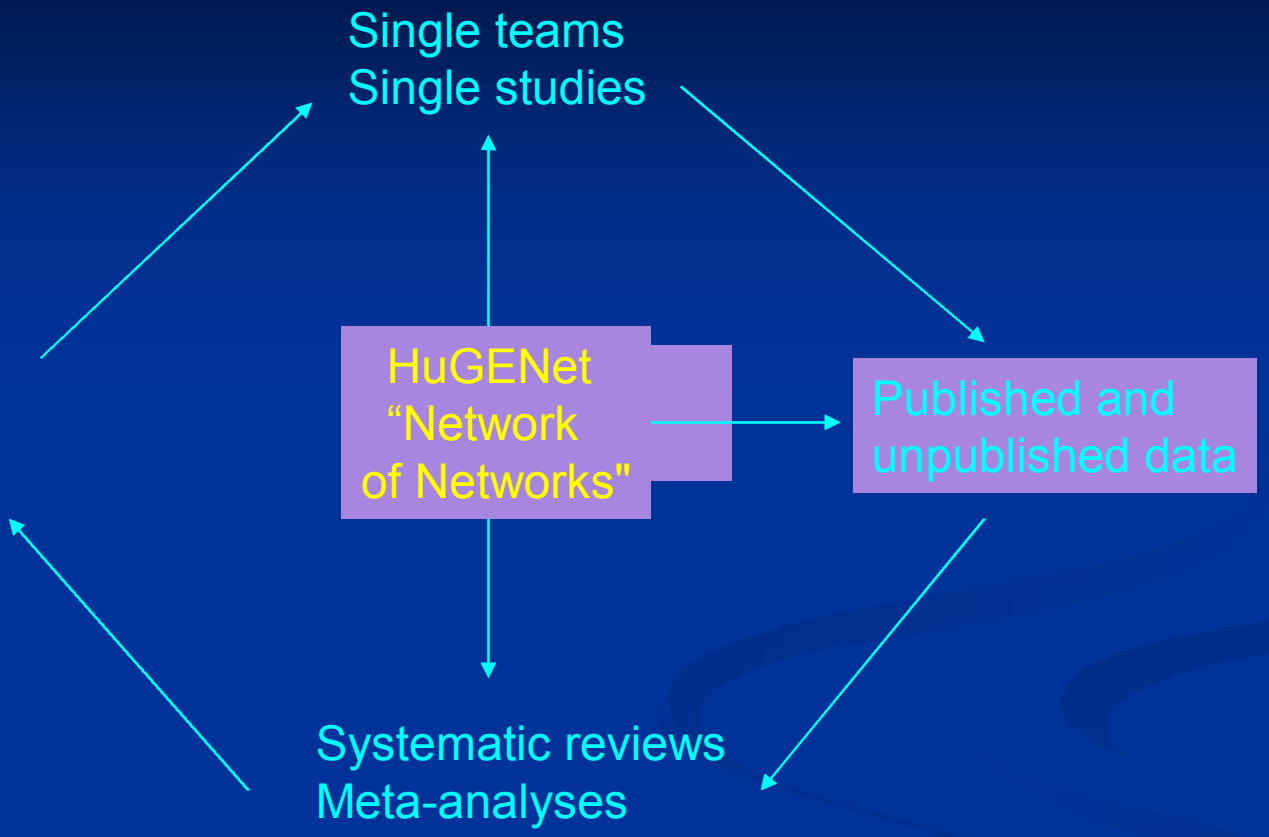
HuGE Literature Trends

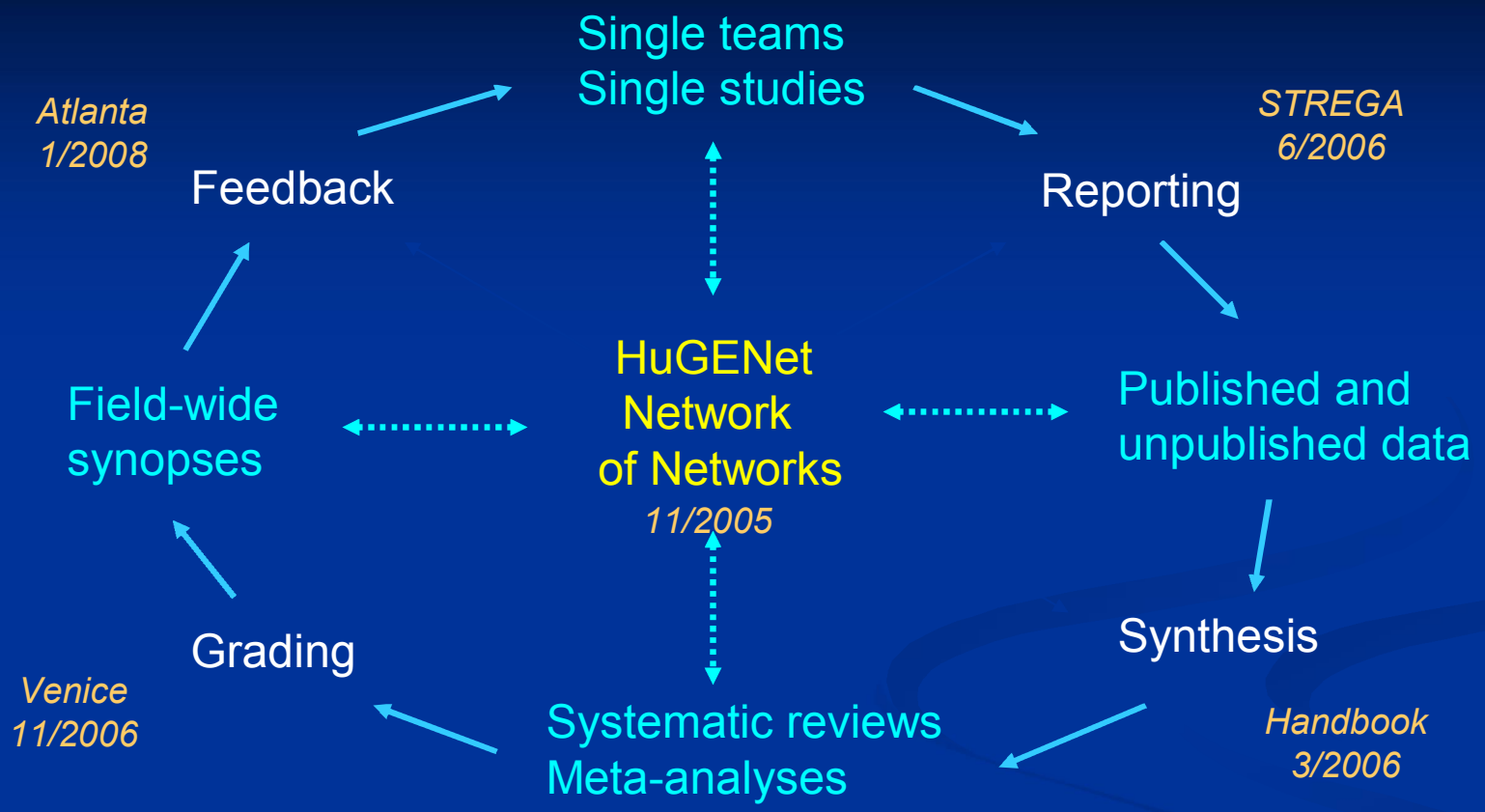
(HuGE Navigator as of January 3, 2008)






Single teams
Single studies
Consortia /
Networks
Published and
unpublished data
Systematic reviews
Meta-analyses


Single teams
Single studies
HuGENet
"Network
of Networks"
Published and
unpublished data
Systematic reviews
Meta-analyses



Commentary, *Nature Genetics* 38, 3 - 5 (2006)
A road map for efficient and reliable human genome epidemiology

HuGENet Workshop Papers

- Ioannidis JP, Bernstein J, Boffetta P, Danesh J, Dolan S, Hartge P, Hunter D, Inskip P, Jarvelin MR, Little J, Maraganore DM, Bishop JA, O'Brien TR, Petersen G, Riboli E, Seminara D, Taioli E, Uitterlinden AG, Vineis P, Winn DM, Salanti G, Higgins JP, Khoury MJ. A network of investigator networks in human genome epidemiology. *Am J Epidemiol*. 2005 Aug 15;162(4):302-4.

- Higgins JP, Little J, Ioannidis JP, Bray MS, Manolio TA, Smeeth L, Sterne JA, Anagnostelis B, Butterworth AS, Danesh J, Dezateux C, Gallacher JE, Gwinn M, Lewis SJ, Minelli C, Pharoah PD, Salanti G, Sanderson S, Smith LA, Taioli E, Thompson JR, Thompson SG, Walker N, Zimmern RL, Khoury MJ. Turning the pump handle: evolving methods for integrating the evidence on gene-disease association. *Am J Epidemiol*. 2007 Oct 15;166(8):863-6.

- Ioannidis JP, Boffetta P, Little J, O'Brien TR, Uitterlinden AG, Vineis P, Balding DJ, Chokkalingam A, Dolan SM, Flanders WD, Higgins JP, McCarthy MI, McDermott DH, Page GP, Rebbeck TR, Seminara D, Khoury MJ. Assessment of cumulative evidence on genetic associations: interim guidelines. *Int J Epidemiol*. 2008 Feb;37(1):120-32.

- Seminara D, Khoury MJ, O'Brien TR, Manolio T, Gwinn ML, Little J, Higgins JP, Bernstein JL, Boffetta P, Bondy M, Bray MS, Brenchley PE, Buffler PA, Casas JP, Chokkalingam AP, Danesh J, Davey Smith G, Dolan S, Duncan R, Gruis NA, Hashibe M, Hunter D, Jarvelin MR, Malmer B, Maraganore DM, Newton-Bishop JA, Riboli E, Salanti G, Taioli E, Timpson N, Uitterlinden AG, Vineis P, Wareham N, Winn DM, Zimmern R, Ioannidis JP; Human Genome Epidemiology Network; the Network of Investigator Networks. The emergence of networks in human genome epidemiology: challenges and opportunities. *Epidemiology*. 2007 Jan;18(1):1-8.

HuGENet Road Map: Embracing Risk

- Ioannidis JP, Gwinn M, Little J, Higgins JP, Bernstein JL, Boffetta P, Bondy M, Bray MS, Brenchley PE, Buffler PA, Casas JP, Chokkalingam A, Danesh J, Smith GD, Dolan S, Duncan R, Gruis NA, Hartge P, Hashibe M, Hunter DJ, Jarvelin MR, Malmer B, Maraganore DM, Newton-Bishop JA, O'Brien TR, Petersen G, Riboli E, Salanti G, Seminara D, Smeeth L, Taioli E, Timpson N, Uitterlinden AG, Vineis P, Wareham N, Winn DM, Zimmern R, Khoury MJ; Human Genome Epidemiology Network and the Network of Investigator Networks. A road map for efficient and reliable human genome epidemiology. *Nat Genet*. 2006 Jan;38(1):3-5.

- Embracing risk. *Nat Genet*. 2006 Jan;38(1):1.

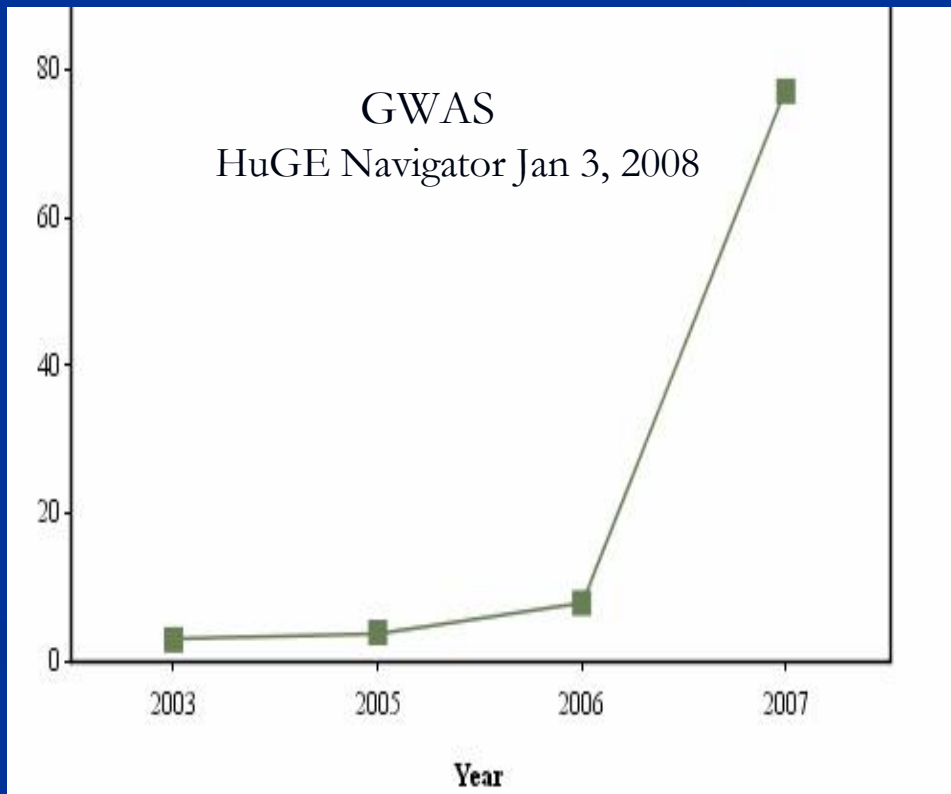
What is a Field Synopsis?

- A regularly updated snapshot of “what we know and what we don’t know” about the association of a particular field (disease, phenotype, or group of conditions) with human genetic variation

- Some desirable features of field synopses
  - Systematic (published/unpublished)
  - Accessible online
  - Updated
  - Authoritative
  - Cumulative quantitative assessment
  - Grading of evidence
  - Linkage with other data/information

What about GWAS?

Elizabeth Pennisi.
Breakthrough of the year:
Human genetic variation.
Science 21 December 2007
318: 1842-1843



Successes of GWAS

- Celiac disease
- Atrial fibrillation
- Colorectal cancer
- Breast cancer
- Prostate cancer
- Diabetes
- Gallstones
- Asthma
- Multiple sclerosis
- Rheumatoid arthritis
- Crohn disease
- Age-related macular degeneration

Workshop Processes and Outcomes

- I. HuGENet roadmap in the era of GWAS
- II. Field synopsis experience to date using Venice guidelines
- III. Online databases and informatics tools
- IV. Methodologic issues/linkage with data collection
- V. Concepts of online knwoeldge bases/encyclopedia
- VI. Next steps and plans

Peer Reviewed Publication